

REMARKS

This paper responds to the Office Action mailed on December 5, 2006.

Claims 8, 13, 16 and 24 are amended, no claims are canceled, and no claims are added; as a result, claims 8-53 are now pending in this application.

§103 Rejection of the Claims

Claims 8-27 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. U.S. 6,562,698 to Manor (hereinafter, “the Manor ‘698 reference”) in view of U.S. Patent No. 6,420,245 to Manor (hereinafter, “the Manor ‘245 reference”) and further in view of U.S. Published Application No. 2001/0034564 to Jones (hereinafter, “the Jones reference”), and further in view of U.S. Published Application No. 2002/0086137 to Brouillette *et al.* (hereinafter, “the Brouillette reference”). Claims 9, 15, 18 and 27 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Manor ‘698 reference in view of the Manor ‘245 reference, and in view of the Jones reference and the Brouillette reference as applied to claims 10 and 16, and further in view of U.S. Patent No. 3,691,707 to Von Arx, *et al.* (hereinafter, “the von Arx reference”). Claims 17 and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Manor ‘698 reference in view of the Manor ‘245 reference, and in view of the Jones reference and the Brouillette reference as applied to claims 16 and 24, and further in view of U.S. Patent No. 6,008,069 to Yamada (hereinafter, “the Yamada reference”). Applicants disagree with the stated grounds of rejection and desire to further clarify various distinctions of the present invention over the cited art. Reconsideration of the present application is therefore requested in light of the present amendment and following remarks.

The Examiner has cited the Manor ‘245 reference as pertinent to the patentability of claims in the present application. Specifically, the examiner has cited the Manor ‘245 reference for disclosing the formation of scribe lines on a wafer with a laser, and cutting the wafer at the scribe lines using a mechanical sawing operation. Manor ‘245 has also been cited for disclosing wafer dicing feed rates. The Examiner has also cited the Manor ‘698 reference for disclosing a pair of scribing and cutting laser beams that scribe and cut a wafer, with the lasers positioned in an in-line configuration.

The Jones reference has been cited for forming scribe lines with a cutting with a cutting saw, a dicing wheel, or a laser beam. The Brouillette reference has been cited for disclosing scribing a groove in a wafer, and sawing along the groove to a scribe depth of about one-half the thickness of the wafer, or until the remaining thickness is about 30 microns thick. The Mueller reference is cited for disclosing various laser duty cycles and power levels applicable to industrial lasers. The Von Arx reference is cited for disclosing cutting a wafer with a diamond nickel saw. Finally, the Yamada reference is cited for disclosing a rotary blade feed rate of about 100 millimeters per second.

With reference now to the rejection of claims 8-27, Applicants submit that none of the applied references disclose, or fairly suggest providing a coolant onto a surface of a semiconductor wafer within, or proximate to the scribe location on the semiconductor wafer. In contrast, embodiments of the present invention provide for the distribution of a coolant to the semiconductor wafer in order to mitigate the thermal effects of the cutting operation. The Examiner is directed, *inter-alia*, to page 9, lines 8-15 for this teaching. Applicants further note that, in fact, the Manor '698 reference explicitly *teaches away* from the application of a coolant to the wafer, so that the thermal effects of the cutting operation are minimized. The Examiner is directed to col. 2, lines 48-61, which states in pertinent part: "Additional disadvantages of using mechanical dicing include...the need for a cooling liquid during the cutting operation....".

Referring now to the claims, distinguishing differences between the claim language and the applied references will be specifically pointer out. Claim 8, as amended, recites in pertinent part: "A method for dicing workpieces, comprising...scribing a workpiece with a laser to form a scribe having a depth of at least 25 microns...*directing a coolant onto the scribe*...and...completely cutting through the workpiece along the scribe with a mechanical cutter that follows the scribe created by the laser." (Emphasis added). None of the applied references disclose or fairly suggest this. In fact, Applicants note that the Manor '698 reference explicitly teaches away from the use of coolants. Claim 8 is therefore now allowable over the cited references. Claims depending from claim 8 are also allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 13, as amended, recites: “A method for dicing workpieces, comprising...scribing a workpiece with a laser along a saw street to form a scribe having a depth of at least 25 microns... *providing a coolant to a surface of the workpiece proximate to the scribe...*and...completely cutting through the workpiece with a mechanical cutter in the same saw street being scribed by the laser, wherein the laser and the mechanical cutter simultaneously contact the workpiece.”. (Emphasis added). Again, Applicants cannot find any disclosure or suggestion of a coolant applied to the wafer. Claim 13 is also allowable over the cited references. Claims depending from claim 13 are also allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Claim 16, as amended, recites: “A method for dicing workpieces, comprising...moving a workpiece relative to a laser...scribing a workpiece with the laser to form a scribe having a depth of at least 25 microns...*locally cooling a surface of the workpiece by providing a coolant proximate to the scribe...*and...completely cutting through the workpiece along the scribe with a mechanical cutter that follows a scribe created by the laser.”. (Emphasis added). There is no disclosure or suggestion in the applied references that the wafer may be locally cooled proximate to the scribe. Accordingly, claim 16 is allowable over the cited references. Claims depending from claim 16 are also allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

Finally, claim 24, as amended, recites: “A method for dicing an integrated circuit substrate, comprising...moving a substrate relative to a laser...partially ablating a saw street in the substrate with a laser to form a scribe having a depth of at least 25 microns...*cooling the scribe by providing a coolant proximate to the scribe...*and...completely cutting through the saw street of the substrate along the scribe with a mechanical cutter that follows the scribe created by the laser.”. (Emphasis added). Again, there is no disclosure or suggestion in the applied references for this. Claim 24 is also now allowable over the cited references. Claims depending from claim 24 are also allowable based upon the allowable form of the base claim and further in view of the additional limitations recited in the dependent claims.

With respect to the Examiner’s rejection of claims 9, 15, 18 and 27, Applicants submit that the Mueller reference fails to provide the teaching missing from the asserted combination of the Manor ‘698 reference, the Manor ‘245 reference, the Jones reference, and the Brouillette

reference. Specifically, the Mueller reference fails to disclose or suggest applying a coolant to the wafer surface during a cutting operation.

With respect to the rejection of claims 11 and 20, Applicants submit that the Von Arx reference also fails to provide the teaching missing from the asserted combination of the Manor '698 reference, the Manor '245 reference, the Jones reference, and the Brouillette reference.

Finally, with reference to the rejection of claims 17 and 26, Applicants submit that the Yamada reference also fails to provide the teaching missing from the asserted combination of the Manor '698 reference, the Manor '245 reference, the Jones reference, and the Brouillette reference.

Reservation of Rights

In the interest of clarity and brevity, Applicant may not have equally addressed every assertion made in the Office Action, however, this does not constitute any admission or acquiescence. Applicant reserves all rights not exercised in connection with this response, such as the right to challenge or rebut any tacit or explicit characterization of any reference or of any of the present claims, the right to challenge or rebut any asserted factual or legal basis of any of the rejections, the right to swear behind any cited reference such as provided under 37 C.F.R. § 1.131 or otherwise, or the right to assert co-ownership of any cited reference. Applicant does not admit that any of the cited references or any other references of record are relevant to the present claims, or that they constitute prior art. To the extent that any rejection or assertion is based upon the Examiner's personal knowledge, rather than any objective evidence of record as manifested by a cited prior art reference, Applicant timely objects to such reliance on Official Notice, and reserves all rights to request that the Examiner provide a reference or affidavit in support of such assertion, as required by MPEP § 2144.03. Applicant reserves all rights to pursue any cancelled claims in a subsequent patent application claiming the benefit of priority of the present patent application, and to request rejoinder of any withdrawn claim, as required by MPEP § 821.04.

Serial Number: 10/823,314

Filing Date: April 13, 2004

Title: WAFER DICING DEVICE AND METHOD

CONCLUSION

Applicants respectfully submit that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicants' attorney (612) 349-9587 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 349-9587

Date

30 Oct. '07

By

A handwritten signature in black ink, appearing to read "Timothy B. Clise".

Timothy B. Clise
Reg. No. 40,957

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Mail Stop RCE, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 31 day of October 2007.

Zhakalbeky M. Carrion

Name

A handwritten signature in black ink, appearing to read "Zhakalbeky M. Carrion".

Signature